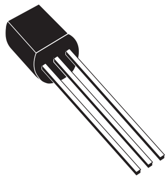
L78LxxAB
L78LxxAC - L78LxxC

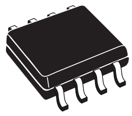
Positive voltage regulators

Features

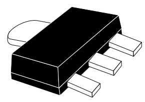
- Output current up to 100 mA
- Output voltages of 3.3; 5; 6; 8; 9; 10; 12; 15; 18; 24 V
- Thermal overload protection
- Short circuit protection
- No external components are required
- Available in either ± 4 % (AC) or ± 8 % (C) selection



TO-92



SO-8



SOT-89

Description

The L78Lxx series of three-terminal positive regulators employ internal current limiting and thermal shutdown, making them essentially indestructible. If adequate heat-sink is provided, they can deliver up to 100 mA output current. They are intended as fixed voltage regulators in a wide range of applications including local or on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power pass elements to make high-current voltage regulators. The L78Lxx series used as Zener diode/resistor combination replacement, offers an effective output impedance improvement of typically two orders of magnitude, along with lower quiescent current and lower noise.

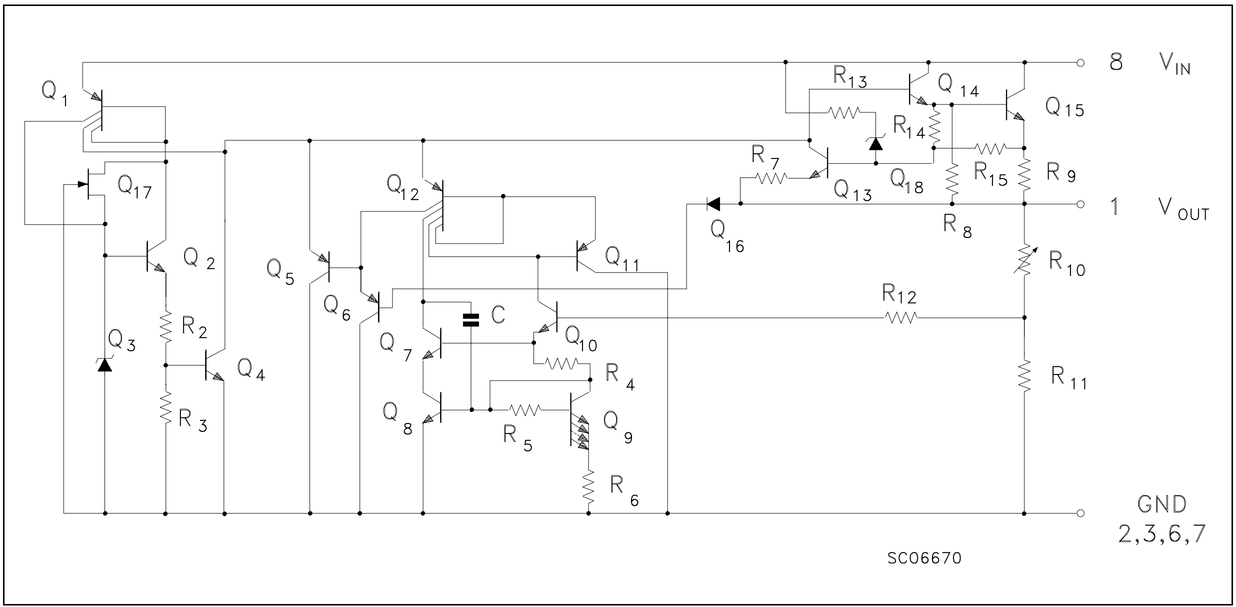
Table 1. Device summary

Part numbers		
L78L33C	L78L08AC	L78L15C
L78L33AC	L78L08AB	L78L15AC
L78L33AB	L78L09C	L78L15AB
L78L05C	L78L09AC	L78L18C
L78L05AC	L78L09AB	L78L18AC
L78L05AB	L78L10AC	L78L24C
L78L06AC	L78L12C	L78L24AC
L78L06AB	L78L12AC	L78L24AB
L78L08C	L78L12AB	

Contents

1 Diagram

Figure 1. Schematic diagram



2 Pin configuration

Figure 2. Pin connection (top view, bottom view for TO-92)

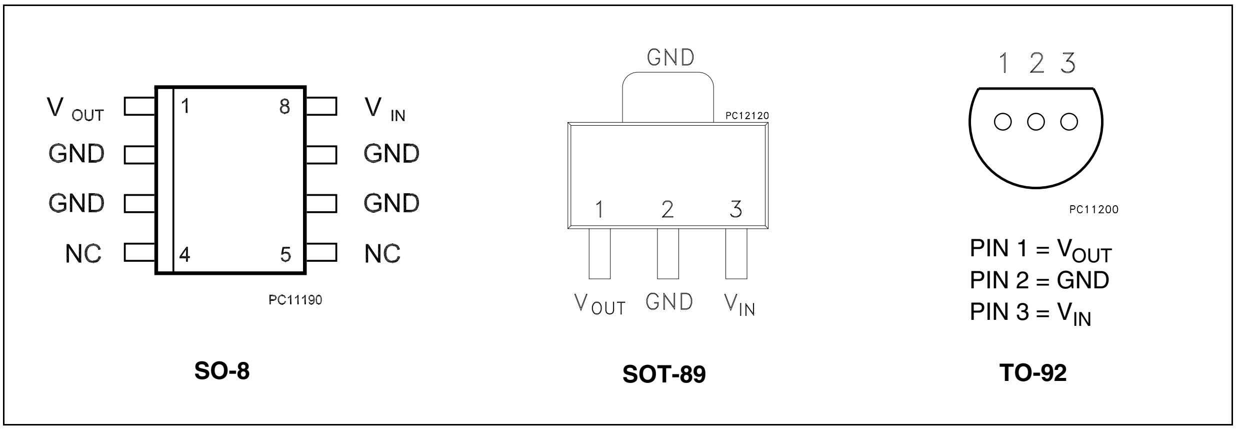
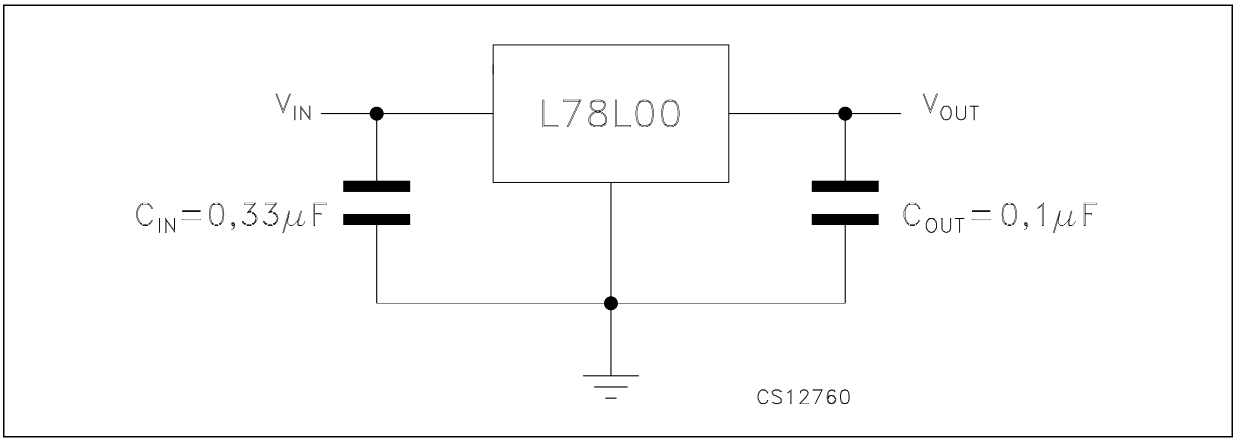


Figure 3. Test circuits



3 Maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter		Value	Unit
V_I	DC Input voltage	V_O= 3.3 to 9 V	30	V
		V_O= 12 to 15 V	35	
		V_O= 18 to 24 V	40	
I_O	Output current		100	mA
P_D	Power dissipation		Internally limited (1)	mW
T_{STG}	Storage temperature range		-65 to 150	°C
T_{OP}	Operating junction temperature range	for L78L00AC	0 to 150	°C
		for L78L00AB	-40 to 125	

1. Our SO-8 package used for voltage regulators is modified internally to have pins 2, 3, 6 and 7 electrically communed to the die attach flag. This particular frame decreases the total thermal resistance of the package and increases its ability to dissipate power when an appropriate area of copper on the printed circuit board is available for heat-sinking. The external dimensions are the same as for the standard SO-8.

Table 3. Thermal data

Symbol	Parameter	SO-8	TO-92	SOT-89	Unit
R_{thJC}	Thermal resistance junction-case. (max)	20		15	°C/W
R_{thJA}	Thermal resistance junction-ambient. (max)	55 (1)	200	55 (1)	°C/W

1. Considering 6 cm² of copper Board heat-sink.

4 Electrical characteristics

Refer to the test circuits, T_J = 0 to 125 °C, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified.

Table 4. Electrical characteristics of L78L33C (V_I = 8.3 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	3.036	3.3	3.564	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 5.3 to 20 V	2.97		3.63	V
		I_O = 1 to 70 mA, V_I = 8.3 V	2.97		3.63	
ΔV_O	Line regulation	V_I = 5.3 to 20 V, T_J = 25 °C			150	mV
		V_I = 6.3 to 20 V, T_J = 25 °C			100	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			60	mV
		I_O = 1 to 40 mA, T_J = 25 °C			30	
I_d	Quiescent current	T_J = 25 °C			6	mA
		T_J = 125 °C			5.5	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.2	mA
		V_I = 6.3 to 20 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		40		µV
SVR	Supply voltage rejection	V_I = 6.3 to 16.3 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	41	49		dB
V_d	Dropout voltage			1.7		V

Table 5. Electrical characteristics of L78L05C (V_I = 10 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	4.6	5	5.4	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 7 to 20 V	4.5		5.5	V
		I_O = 1 to 70 mA, V_I = 10 V	4.5		5.5	
ΔV_O	Line regulation	V_I = 8.5 to 20 V, T_J = 25 °C			200	mV
		V_I = 9 to 20 V, T_J = 25 °C			150	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			60	mV
		I_O = 1 to 40 mA, T_J = 25 °C			30	
I_d	Quiescent current	T_J = 25 °C			6	mA
		T_J = 125 °C			5.5	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.2	mA
		V_I = 8 to 20 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		40		µV
SVR	Supply voltage rejection	V_I = 9 to 20 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	40	49		dB
V_d	Dropout voltage			1.7		V

Table 6. Electrical characteristics of L78L08C (V_I = 14 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	7.36	8	8.64	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 8.5 to 20 V	7.2		8.8	V
		I_O = 1 to 70 mA, V_I = 12 V	7.2		8.8	
ΔV_O	Line regulation	V_I = 8.5 to 20 V, T_J = 25 °C			200	mV
		V_I = 9 to 20 V, T_J = 25 °C			150	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			80	mV
		I_O = 1 to 40 mA, T_J = 25 °C			40	
I_d	Quiescent current	T_J = 25 °C			6	mA
		T_J = 125 °C			5.5	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.2	mA
		V_I = 8 to 20 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		60		µV
SVR	Supply voltage rejection	V_I = 9 to 20 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	36	45		dB
V_d	Dropout voltage			1.7		V

Table 7. Electrical characteristics of L78L09C (V_I = 15 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	8.28	9	9.72	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 11.5 to 23 V	8.1		9.9	V
		I_O = 1 to 70 mA, V_I = 15 V	8.1		9.9	
ΔV_O	Line regulation	V_I = 11.5 to 23 V, T_J = 25 °C			250	mV
		V_I = 12 to 23 V, T_J = 25 °C			200	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			80	mV
		I_O = 1 to 40 mA, T_J = 25 °C			40	
I_d	Quiescent current	T_J = 25 °C			6	mA
		T_J = 125 °C			5.5	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.2	mA
		V_I = 12 to 23 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		70		µV
SVR	Supply voltage rejection	V_I = 12 to 23 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	36	44		dB
V_d	Dropout voltage			1.7		V

Table 8. Electrical characteristics of L78L10C (V_I = 16 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	9.2	10	10.8	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 12.5 to 23 V	9		11	V
		I_O = 1 to 70 mA, V_I = 16 V	9		11	
ΔV_O	Line regulation	V_I = 12.5 to 23 V, T_J = 25 °C			230	mV
		V_I = 13 to 23 V, T_J = 25 °C			170	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			80	mV
		I_O = 1 to 40 mA, T_J = 25 °C			40	
I_d	Quiescent current	T_J = 25 °C			6	mA
		T_J = 125 °C			5.5	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.1	mA
		V_I = 13 to 23 V			1.5	
eN	Output noise voltage	B =10Hz to 100kHz, T_J = 25 °C		60		µV
SVR	Supply voltage rejection	V_I = 14 to 23 V, f = 120Hz I_O = 40 mA, T_J = 25 °C	37	45		dB
V_d	Dropout voltage			1.7		V

Table 9. Electrical characteristics of L78L12C (V_I = 19 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	11.1	12	12.9	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 14.5 to 27 V	10.8		13.2	V
		I_O = 1 to 70 mA, V_I = 19 V	10.8		13.2	
ΔV_O	Line regulation	V_I = 14.5 to 27 V, T_J = 25 °C			250	mV
		V_I = 16 to 27 V, T_J = 25 °C			200	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			100	mV
		I_O = 1 to 40 mA, T_J = 25 °C			50	
I_d	Quiescent current	T_J = 25 °C			6.5	mA
		T_J = 125 °C			6	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.2	mA
		V_I = 16 to 27 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		80		µV
SVR	Supply voltage rejection	V_I = 15 to 25 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	36	42		dB
V_d	Dropout voltage			1.7		V

Table 10. Electrical characteristics of L78L15C (V_I = 23 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	13.8	15	16.2	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 17.5 to 30 V	13.5		16.5	V
		I_O = 1 to 70 mA, V_I = 23 V	13.5		16.5	
ΔV_O	Line regulation	V_I = 17.5 to 30 V, T_J = 25 °C			300	mV
		V_I = 20 to 30 V, T_J = 25 °C			250	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			150	mV
		I_O = 1 to 40 mA, T_J = 25 °C			75	
I_d	Quiescent current	T_J = 25 °C			6.5	mA
		T_J = 125 °C			6	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.2	mA
		V_I = 20 to 30 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		90		µV
SVR	Supply voltage rejection	V_I = 18.5 to 28.5 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	33	39		dB
V_d	Dropout voltage			1.7		V

Table 11. Electrical characteristics of L78L18C (V_I = 27 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	16.6	18	19.4	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 22 to 33 V	16.2		19.8	V
		I_O = 1 to 70 mA, V_I = 27 V	16.2		19.8	
ΔV_O	Line regulation	V_I = 22 to 33 V, T_J = 25 °C			320	mV
		V_I = 22 to 33 V, T_J = 25 °C			270	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			170	mV
		I_O = 1 to 40 mA, T_J = 25 °C			85	
I_d	Quiescent current	T_J = 25 °C			6.5	mA
		T_J = 125 °C			6	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.2	mA
		V_I = 23 to 33 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		120		µV
SVR	Supply voltage rejection	V_I = 23 to 33 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	32	38		dB
V_d	Dropout voltage			1.7		V

Table 12. Electrical characteristics of L78L24C (V_I = 33 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	22.1	24	25.9	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 27 to 38 V	21.6		26.4	V
		I_O = 1 to 70 mA, V_I = 33 V	21.6		26.4	
ΔV_O	Line regulation	V_I = 27 to 38 V, T_J = 25 °C			350	mV
		V_I = 28 to 38 V, T_J = 25 °C			300	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			200	mV
		I_O = 1 to 40 mA, T_J = 25 °C			100	
I_d	Quiescent current	T_J = 25 °C			6.5	mA
		T_J = 125 °C			6	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.2	mA
		V_I = 28 to 38 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		200		µV
SVR	Supply voltage rejection	V_I = 29 to 35 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	30	37		dB
V_d	Dropout voltage			1.7		V

T_J = 0 to 125 °C for L78L33AC, T_J = -40 to 125 °C for L78L33AB.

Table 13. Electrical characteristics of L78L33AB and L78L33AC (V_I = 8.3 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	3.168	3.3	3.432	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 5.3 to 20 V	3.135		3.465	V
		I_O = 1 to 70 mA, V_I = 8.3 V	3.135		3.465	
ΔV_O	Line regulation	V_I = 5.3 to 20 V, T_J = 25 °C			150	mV
		V_I = 6.3 to 20 V, T_J = 25 °C			100	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			60	mV
		I_O = 1 to 40 mA, T_J = 25 °C			30	
I_d	Quiescent current	T_J = 25 °C			6	mA
		T_J = 125 °C			5.5	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.1	mA
		V_I = 6.3 to 20 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		40		µV
SVR	Supply voltage rejection	V_I = 6.3 to 16.3 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	41	49		dB
V_d	Dropout voltage			1.7		V

T_J = 0 to 125 °C for L78L05AC, T_J = -40 to 125 °C for L78L05AB.

Table 14. Electrical characteristics of L78L05AB and L78L05AC (V_I = 10 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	4.8	5	5.2	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 7 to 20 V	4.75		5.25	V
		I_O = 1 to 70 mA, V_I = 10 V	4.75		5.25	
ΔV_O	Line regulation	V_I = 7 to 20 V, T_J = 25 °C			150	mV
		V_I = 8 to 20 V, T_J = 25 °C			100	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			60	mV
		I_O = 1 to 40 mA, T_J = 25 °C			30	
I_d	Quiescent current	T_J = 25 °C			6	mA
		T_J = 125 °C			5.5	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.1	mA
		V_I = 8 to 20 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		40		µV
SVR	Supply voltage rejection	V_I = 8 to 18 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	41	49		dB
V_d	Dropout voltage			1.7		V

T_J = 0 to 125 °C for L78L06AC, T_J = -40 to 125 °C for L78L06AB.

Table 15. Electrical characteristics of L78L06AB and L78L06AC (V_I = 12 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	5.76	6	6.24	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 8.5 to 20 V	5.7		6.3	V
		I_O = 1 to 70 mA, V_I = 12 V	5.7		6.3	
ΔV_O	Line regulation	V_I = 8.5 to 20 V, T_J = 25 °C			150	mV
		V_I = 9 to 20 V, T_J = 25 °C			100	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			60	mV
		I_O = 1 to 40 mA, T_J = 25 °C			30	
I_d	Quiescent current	T_J = 25 °C			6	mA
		T_J = 125 °C			5.5	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.1	mA
		V_I = 9 to 20 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		50		µV
SVR	Supply voltage rejection	V_I = 9 to 20 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	39	46		dB
V_d	Dropout voltage			1.7		V

T_J = 0 to 125 °C for L78L08AC, T_J = -40 to 125 °C for L78L08AB.

Table 16. Electrical characteristics of L78L08AB and L78L08AC (V_I = 14 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	7.68	8	8.32	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 10.5 to 23 V	7.6		8.4	V
		I_O = 1 to 70 mA, V_I = 14 V	7.6		8.4	
ΔV_O	Line regulation	V_I = 10.5 to 23 V, T_J = 25 °C			175	mV
		V_I = 11 to 23 V, T_J = 25 °C			125	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			80	mV
		I_O = 1 to 40 mA, T_J = 25 °C			40	
I_d	Quiescent current	T_J = 25 °C			6	mA
		T_J = 125 °C			5.5	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.1	mA
		V_I = 11 to 23 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		60		µV
SVR	Supply voltage rejection	V_I = 12 to 23 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	37	45		dB
V_d	Dropout voltage			1.7		V

T_J = 0 to 125 °C for L78L09AC, T_J = -40 to 125 °C for L78L09AB.

Table 17. Electrical characteristics of L78L09AB and L78L09AC (V_I = 15 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	8.64	9	9.36	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 11.5 to 23 V	8.55		9.45	V
		I_O = 1 to 70 mA, V_I = 15 V	8.55		9.45	
ΔV_O	Line regulation	V_I = 11.5 to 23 V, T_J = 25 °C			225	mV
		V_I = 12 to 23 V, T_J = 25 °C			150	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			80	mV
		I_O = 1 to 40 mA, T_J = 25 °C			40	
I_d	Quiescent current	T_J = 25 °C			6	mA
		T_J = 125 °C			5.5	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.1	mA
		V_I = 12 to 23 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		70		µV
SVR	Supply voltage rejection	V_I = 12 to 23 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	37	44		dB
V_d	Dropout voltage			1.7		V

T_J = 0 to 125 °C for L78L10AC, T_J = -40 to 125 °C for L78L10AB.

Table 18. Electrical characteristics of L78L10AC (V_I = 16 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	9.6	10	10.4	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 12.5 to 23 V	9.5		10.5	V
		I_O = 1 to 70 mA, V_I = 16 V	9.5		10.5	
ΔV_O	Line regulation	V_I = 12.5 to 23 V, T_J = 25 °C			230	mV
		V_I = 13 to 23 V, T_J = 25 °C			170	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			80	mV
		I_O = 1 to 40 mA, T_J = 25 °C			40	
I_d	Quiescent current	T_J = 25 °C			6	mA
		T_J = 125 °C			5.5	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.1	mA
		V_I = 13 to 23 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		60		µV
SVR	Supply voltage rejection	V_I = 14 to 23 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	37	45		dB
V_d	Dropout voltage			1.7		V

T_J = 0 to 125 °C for L78L12AC, T_J = -40 to 125 °C for L78L12AB.

Table 19. Electrical characteristics of L78L12AB and L78L12AC (V_I = 19 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	11.5	12	12.5	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 14.5 to 27 V	11.4		12.6	V
		I_O = 1 to 70 mA, V_I = 19 V	11.4		12.6	
ΔV_O	Line regulation	V_I = 14.5 to 27 V, T_J = 25 °C			250	mV
		V_I = 16 to 27 V, T_J = 25 °C			200	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			100	mV
		I_O = 1 to 40 mA, T_J = 25 °C			50	
I_d	Quiescent current	T_J = 25 °C			6.5	mA
		T_J = 125 °C			6	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.1	mA
		V_I = 16 to 27 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		80		µV
SVR	Supply voltage rejection	V_I = 15 to 25 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	37	42		dB
V_d	Dropout voltage			1.7		V

T_J = 0 to 125 °C for L78L15AC, T_J = -40 to 125 °C for L78L15AB.

Table 20. Electrical characteristics of L78L15AB and L78L15AC (V_I = 23 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	14.4	15	15.6	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 17.5 to 30 V	14.25		15.75	V
		I_O = 1 to 70 mA, V_I = 23 V	14.25		15.75	
ΔV_O	Line regulation	V_I = 17.5 to 30 V, T_J = 25 °C			300	mV
		V_I = 20 to 30 V, T_J = 25 °C			250	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			150	mV
		I_O = 1 to 40 mA, T_J = 25 °C			75	
I_d	Quiescent current	T_J = 25 °C			6.5	mA
		T_J = 125 °C			6	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.1	mA
		V_I = 20 to 30 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		90		µV
SVR	Supply voltage rejection	V_I = 18.5 to 28.5 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	34	39		dB
V_d	Dropout voltage			1.7		V

T_J = 0 to 125 °C for L78L18AC, T_J = -40 to 125 °C for L78L18AB.

Table 21. Electrical characteristics of L78L18AC (V_I = 27 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	17.3	18	18.7	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 22 to 33 V	17.1		18.9	V
		I_O = 1 to 70 mA, V_I = 27 V	17.1		18.9	
ΔV_O	Line regulation	V_I = 22 to 33 V, T_J = 25 °C			320	mV
		V_I = 22 to 33 V, T_J = 25 °C			270	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			170	mV
		I_O = 1 to 40 mA, T_J = 25 °C			85	
I_d	Quiescent current	T_J = 25 °C			6.5	mA
		T_J = 125 °C			6	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.1	mA
		V_I = 23 to 33 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		120		µV
SVR	Supply voltage rejection	V_I = 23 to 33 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	33	38		dB
V_d	Dropout voltage			1.7		V

T_J = 0 to 125 °C for L78L24AC, T_J = -40 to 125 °C for L78L24AB.

Table 22. Electrical characteristics of L78L24AB and L78L24AC (V_I = 33 V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25 °C	23	24	25	V
V_O	Output voltage	I_O = 1 to 40 mA, V_I = 27 to 38 V	22.8		25.2	V
		I_O = 1 to 70 mA, V_I = 33 V	22.8		25.2	
ΔV_O	Line regulation	V_I = 27 to 38 V, T_J = 25 °C			350	mV
		V_I = 28 to 38 V, T_J = 25 °C			300	
ΔV_O	Load regulation	I_O = 1 to 100 mA, T_J = 25 °C			200	mV
		I_O = 1 to 40 mA, T_J = 25 °C			100	
I_d	Quiescent current	T_J = 25 °C			6.5	mA
		T_J = 125 °C			6	mA
ΔI_d	Quiescent current change	I_O = 1 to 40 mA			0.1	mA
		V_I = 28 to 38 V			1.5	
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25 °C		200		µV
SVR	Supply voltage rejection	V_I = 29 to 33 V, f = 120 Hz I_O = 40 mA, T_J = 25 °C	31	37		dB
V_d	Dropout voltage			1.7		V

5 Typical performance

Figure 4. L78L05/12 output voltage vs. ambient temperature

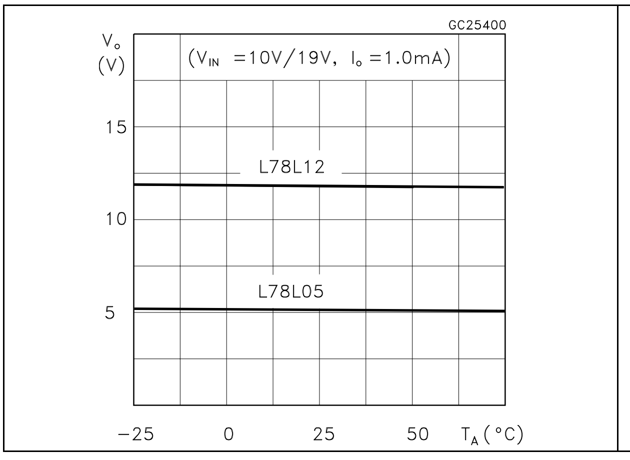


Figure 5. L78L05/12/24 load characteristics

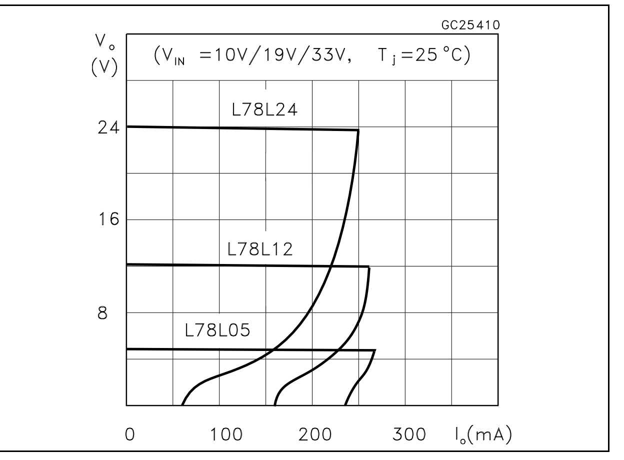


Figure 6. L78L05/12/24 thermal shutdown

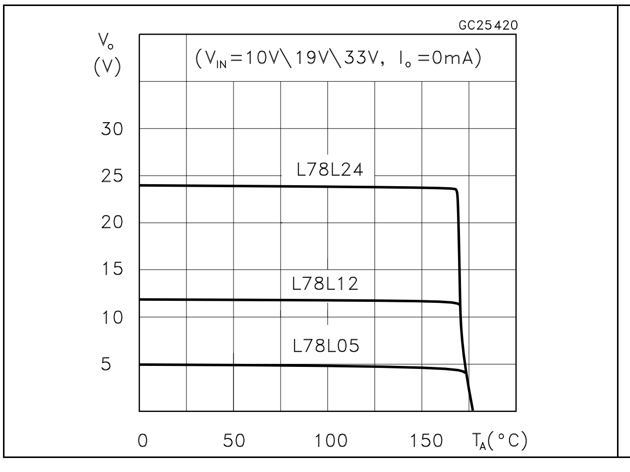


Figure 7. L78L05/12 quiescent current vs. output current

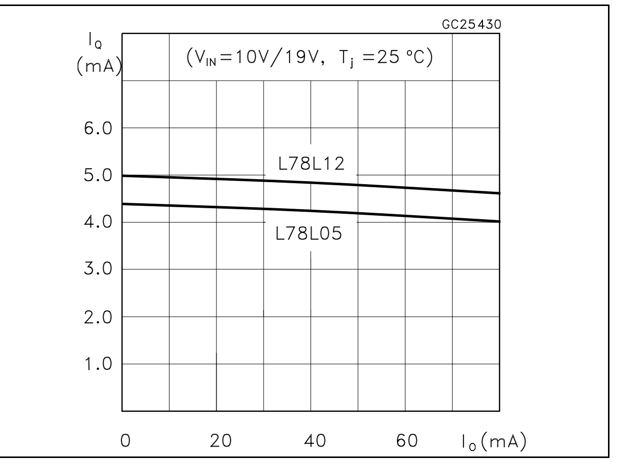


Figure 8. L78L05 quiescent current vs. input voltage

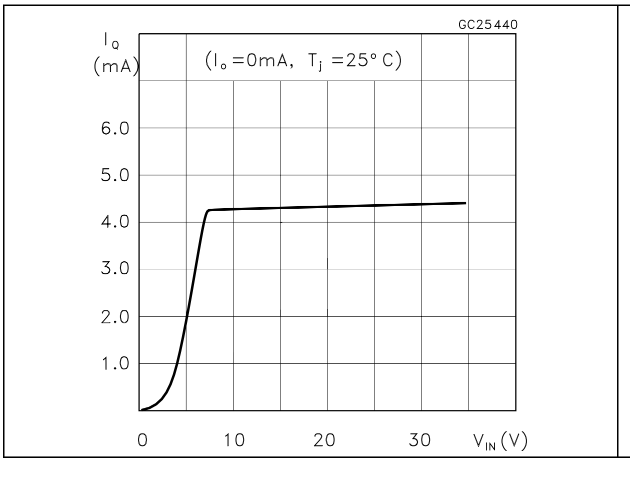


Figure 9. L78L05/12/24 output characteristics

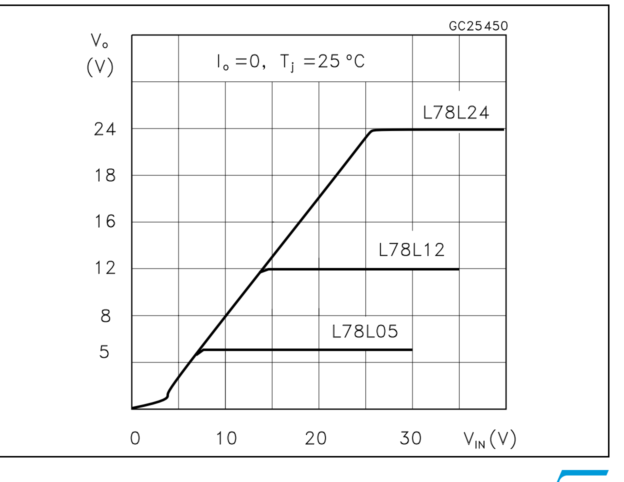


Figure 10. L78L05/12/24 ripple rejection

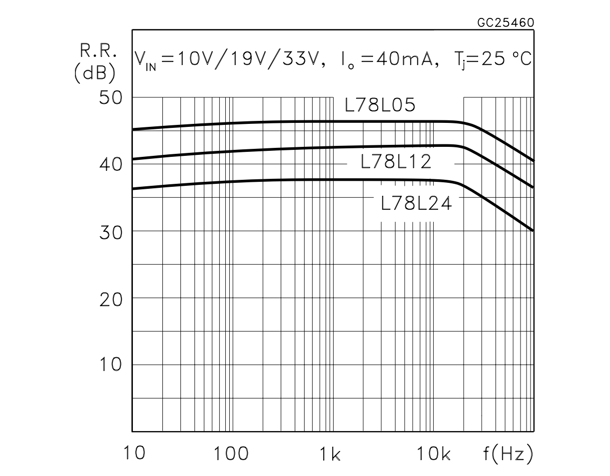


Figure 11. L78L05 dropout characteristics

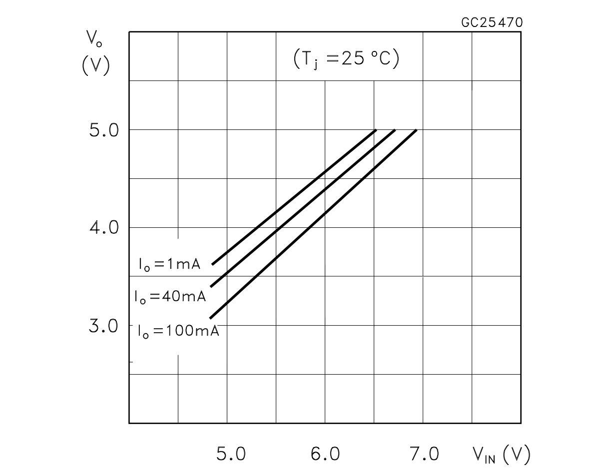
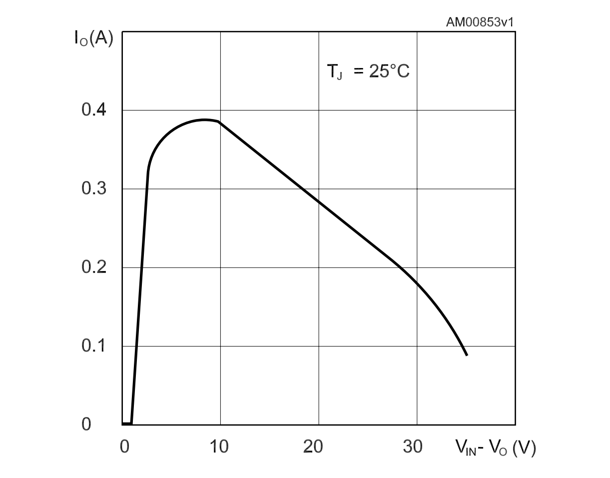


Figure 12. L78Lxx short circuit output current



6 Typical application

Figure 13. High output current short circuit protected

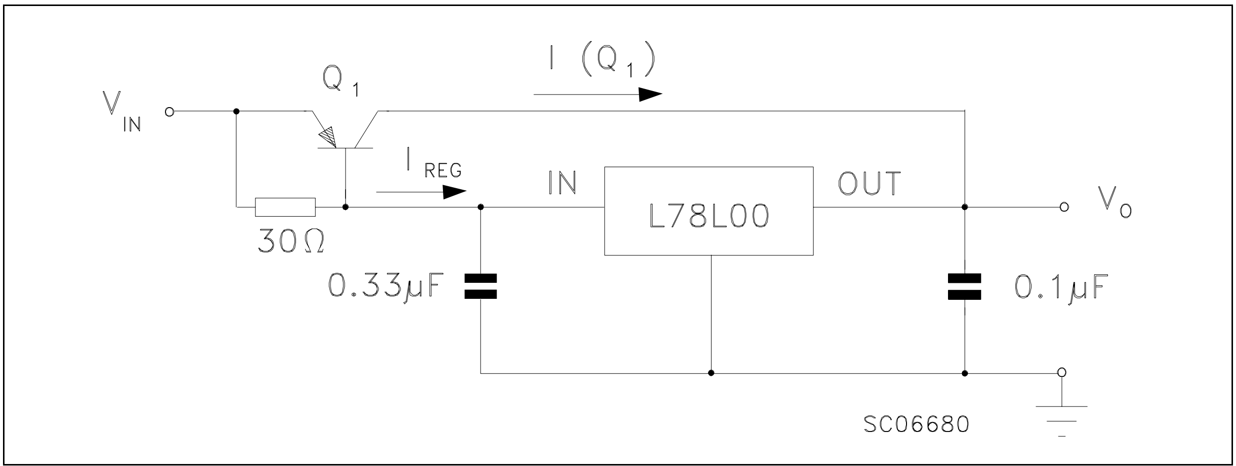


Figure 14. Edit boost circuit

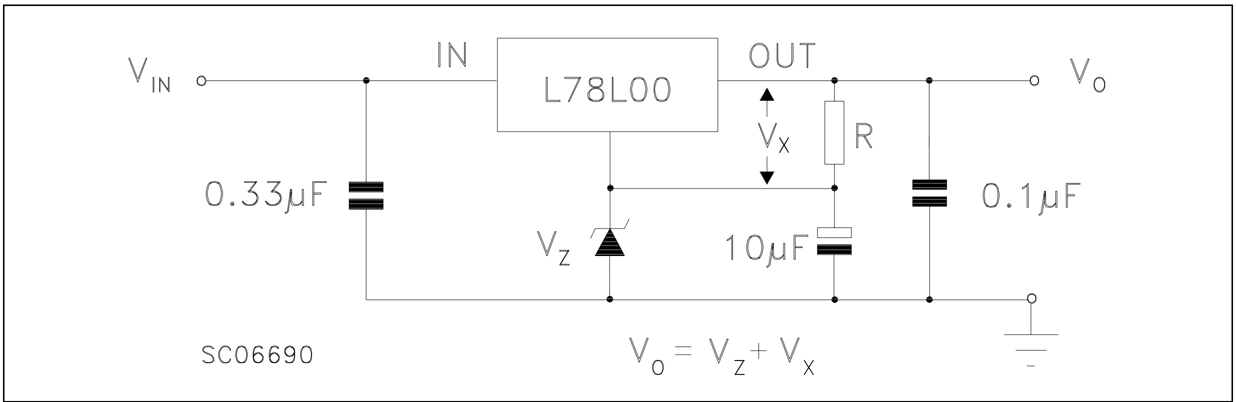


Figure 15. Current regulator

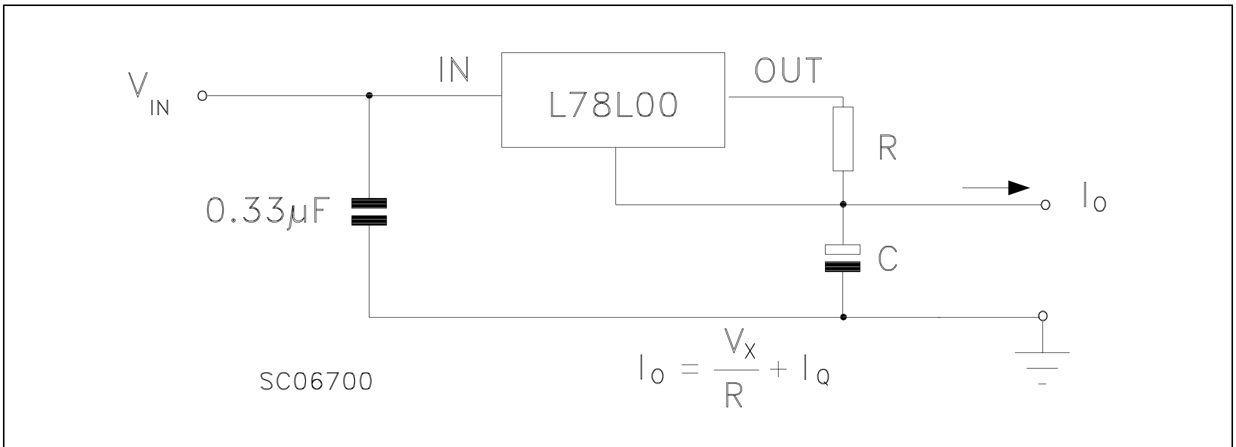
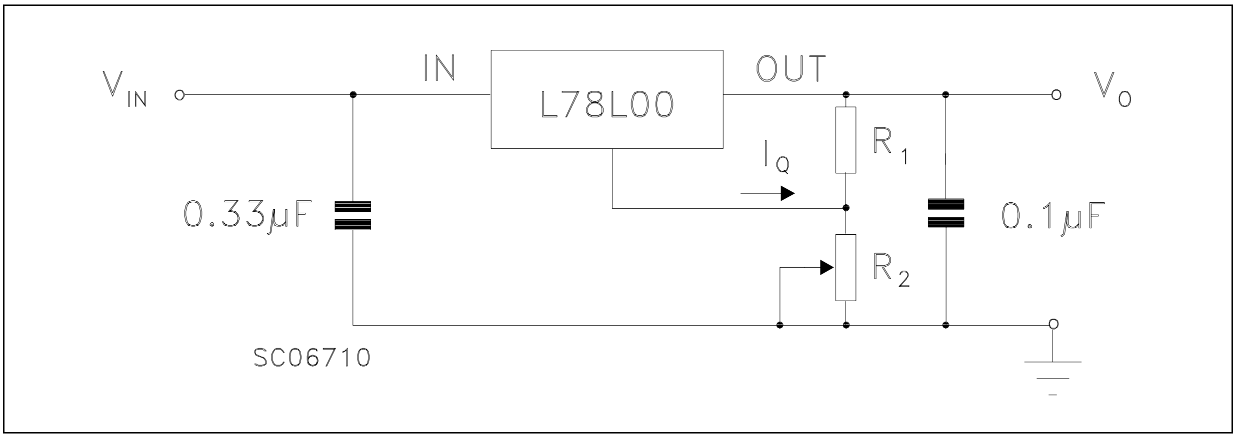


Figure 16. Adjustable output regulator

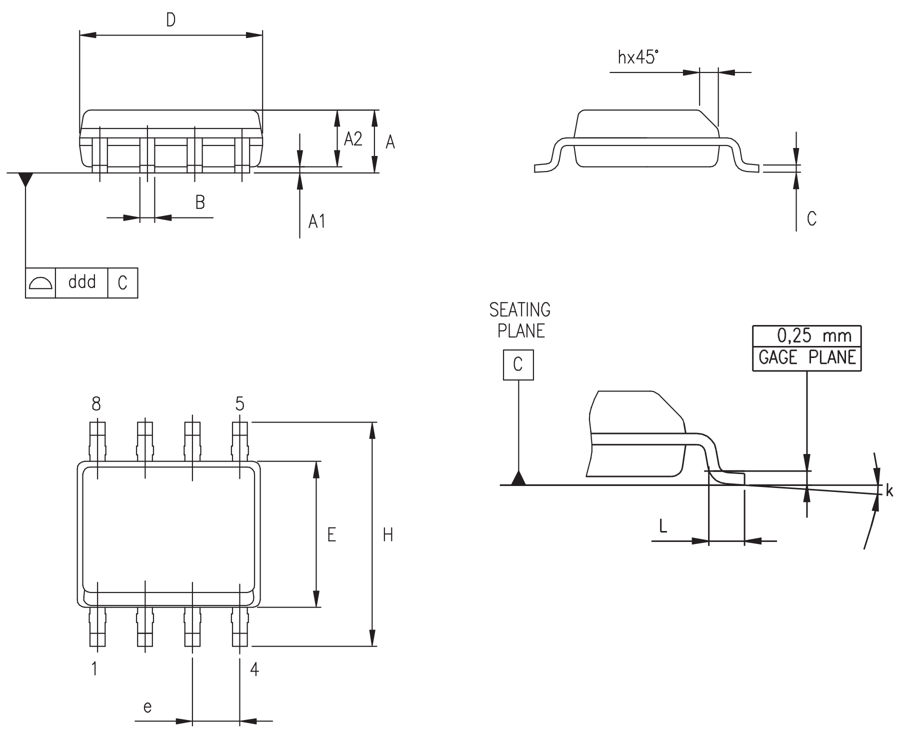


7 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

SO-8 mechanical data

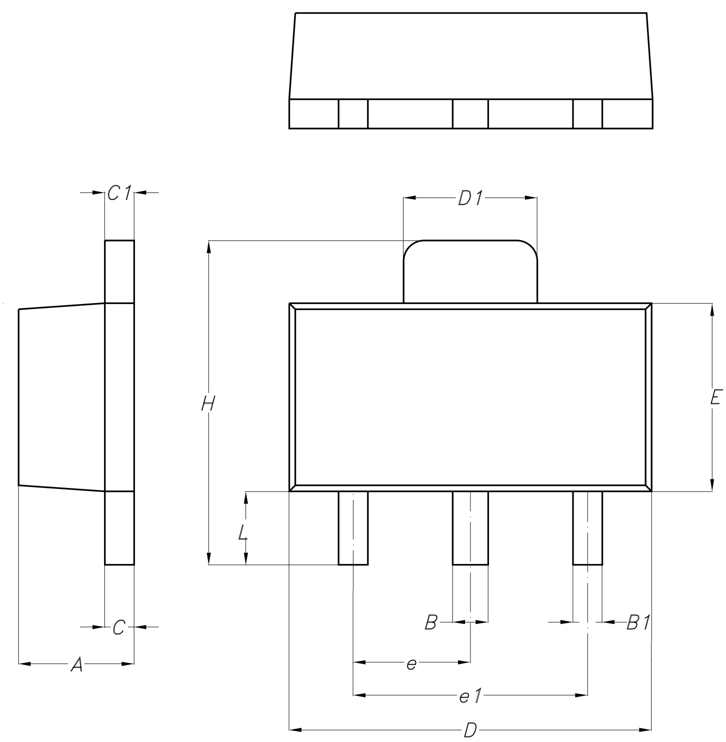
Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.35		1.75	0.053		0.069
A1	0.10		0.25	0.04		0.010
A2	1.10		1.65	0.043		0.065
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.010
D	4.80		5.00	0.189		0.197
E	3.80		4.00	0.150		0.157
e		1.27			0.050	
H	5.80		6.20	0.228		0.244
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
k	8° (max.)					
ddd			0.1			0.04



0016023/C

SOT-89 mechanical data

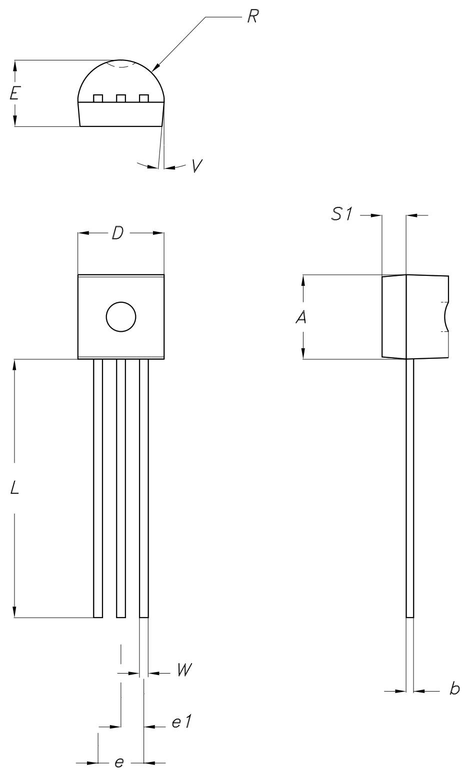
Dim.	mm.			mils.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.4		1.6	55.1		63.0
B	0.44		0.56	17.3		22.0
B1	0.36		0.48	14.2		18.9
C	0.35		0.44	13.8		17.3
C1	0.35		0.44	13.8		17.3
D	4.4		4.6	173.2		181.1
D1	1.62		1.83	63.8		72.0
E	2.29		2.6	90.2		102.4
e	1.42		1.57	55.9		61.8
e1	2.92		3.07	115.0		120.9
H	3.94		4.25	155.1		167.3
L	0.89		1.2	35.0		47.2



P025H

TO-92 mechanical data

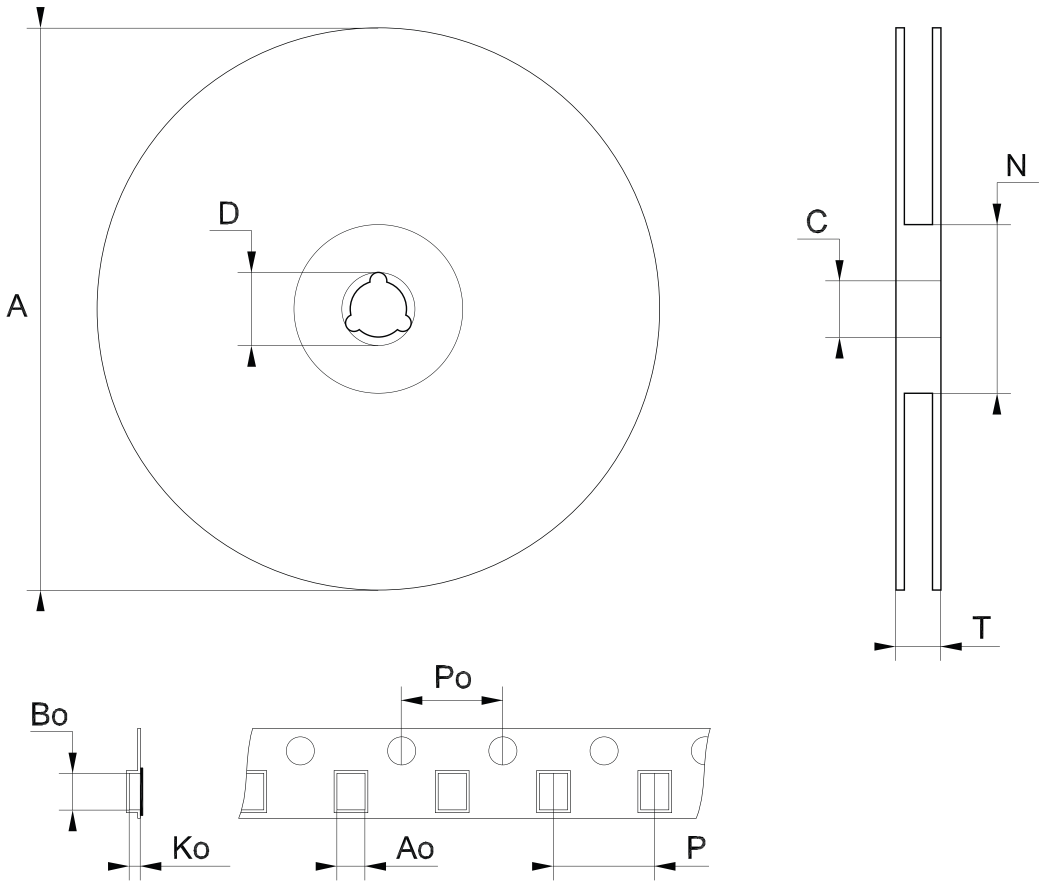
Dim.	mm.			mils.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.32		4.95	170.1		194.9
b	0.36		0.51	14.2		20.1
D	4.45		4.95	175.2		194.9
E	3.30		3.94	129.9		155.1
e	2.41		2.67	94.9		105.1
e1	1.14		1.40	44.9		55.1
L	12.7		15.49	500.0		609.8
R	2.16		2.41	85.0		94.9
S1	0.92		1.52	36.2		59.8
W	0.41		0.56	16.1		22.0
α		5°			5°	



0102782/D

Tape & reel SO-8 mechanical data

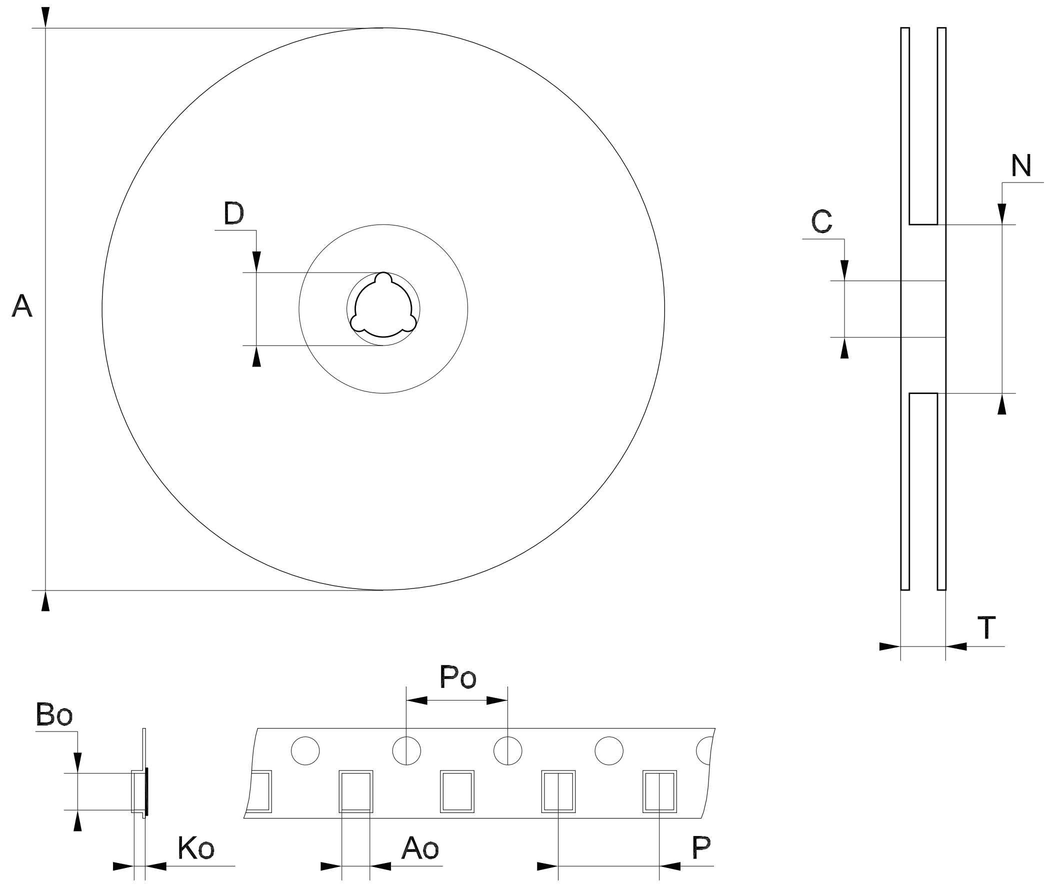
Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	8.1		8.5	0.319		0.335
Bo	5.5		5.9	0.216		0.232
Ko	2.1		2.3	0.082		0.090
Po	3.9		4.1	0.153		0.161
P	7.9		8.1	0.311		0.319



Note: Drawing not in scale

Tape & reel SOT-89 mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			180			7.086
C	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
T			14.4			0.567
Ao	4.70	4.80	4.90	0.185	0.189	0.193
Bo	4.30	4.40	4.50	0.169	0.173	0.177
Ko	1.70	1.80	1.90	0.067	0.071	0.075
Po	3.9	4.0	4.1	0.153	0.157	0.161
P	7.9	8.0	8.1	0.311	0.315	0.319



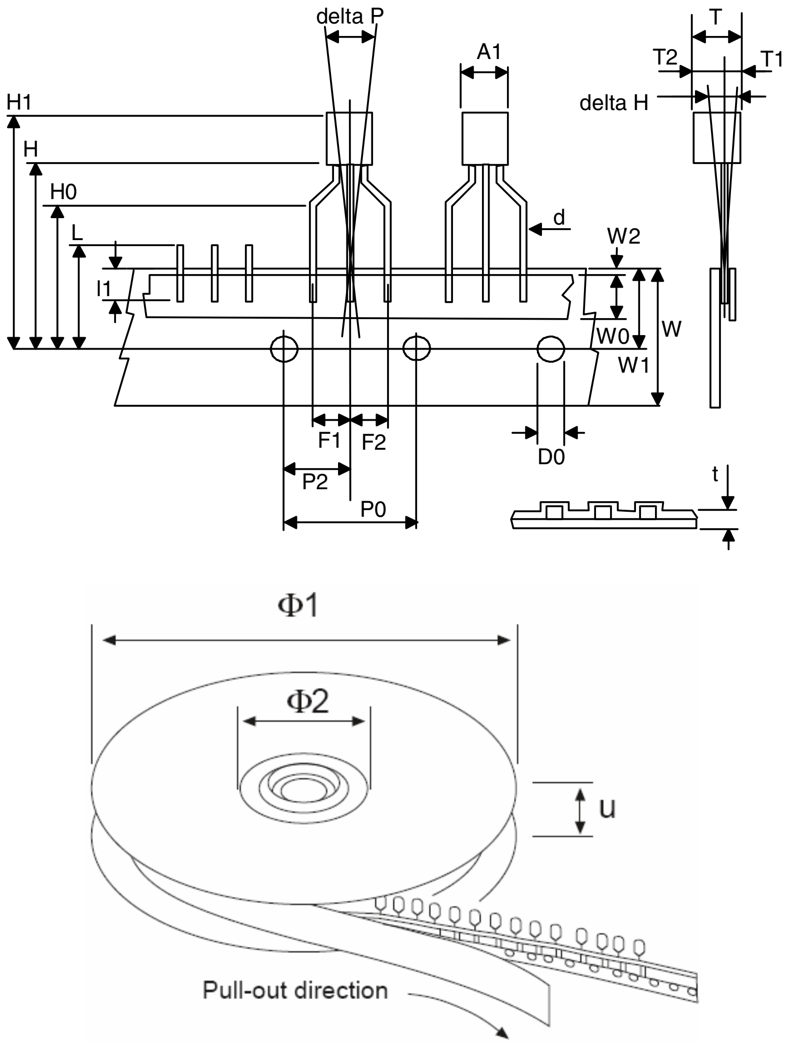
Note: Drawing not in scale

Table 23. Tape and reel TO-92 mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A1 (1)		4.80			0.189	
T (1)		3.80			0.150	
T1		1.60			0.063	
T2		2.30			0.091	
d		0.48			0.019	
P0	12.5		12.9	0.492		0.508
P2	5.65		7.05	0.222		0.278
F1, F2	2.44	2.54	2.94	0.096	0.100	0.116
delta H		±2			0.079	
W	17.5	18.00	19.0	0.689	0.709	0.748
W0	5.7		6.3	0.224		0.248
W1	8.5		9.25	0.335		0.364
W2		0.50			0.20	
H		18.50	18.70		0.728	0.726
H0	15.50		16.50	0.610		0.650
H1		25.00			0.984	
D0	3.8		4.2	0.150		0.165
t		0.90			0.035	
L1		3			0.118	
delta P		±1			0.039	
u		50			1.968	
Φ1		360			14.173	
Φ2		30			1.181	

1. For the MAX and MIN values refer to the TO-92 mechanical data *on page 23*.

Figure 17. Tape and reel TO-92 drawing dimension



DRAWING NOT IN SCALE

8 Order codes

Table 24. Order codes

Part numbers	Packages			Output voltages
	SO-8	TO92 (BAG) [(1)]	SOT-89	
L78L33C	L78L33CD-TR			3.3 V
L78L33AC	L78L33ACD13TR	L78L33ACZ	L78L33ACUTR	3.3 V
L78L33AB	L78L33ABD-TR	L78L33ABZ	L78L33ABUTR	3.3 V
L78L05C	L78L05CD13TR	L78L05CZ		5 V
L78L05AC	L78L05ACD13TR	L78L05ACZ	L78L05ACUTR	5 V
L78L05AB	L78L05ABD13TR	L78L05ABZ	L78L05ABUTR	5 V
L78L06AC	L78L06ACD13TR	L78L06ACZ	L78L06ACUTR	6 V
L78L06AB	L78L06ABD13TR	L78L06ABZ	L78L06ABUTR	6 V
L78L08C	L78L08CD13TR			8 V
L78L08AC	L78L08ACD13TR	L78L08ACZ	L78L08ACUTR	8 V
L78L08AB	L78L08ABD13TR	L78L08ABZ	L78L08ABUTR	8 V
L78L09C	L78L09CD13TR			9 V
L78L09AC	L78L09ACD13TR	L78L09ACZ	L78L09ACUTR	9 V
L78L09AB	L78L09ABD13TR	L78L09ABZ	L78L09ABUTR	9 V
L78L10AC			L78L10ACUTR	10 V
L78L12C	L78L12CD13TR			12 V
L78L12AC	L78L12ACD13TR	L78L12ACZ	L78L12ACUTR	12 V
L78L12AB	L78L12ABD-TR	L78L12ABZ	L78L12ABUTR	12 V
L78L15C	L78L15CD-TR			15 V
L78L15AC	L78L15ACD13TR	L78L15ACZ	L78L15ACUTR	15 V
L78L15AB		L78L15ABZ	L78L15ABUTR	15 V
L78L18C	L78L18CD13TR			18 V
L78L18AC			L78L18ACUTR	18 V
L78L24C	L78L24CD-TR			24 V
L78L24AC		L78L24ACZ	L78L24ACUTR	24 V
L78L24AB		L78L24ABZ		24 V

1. Available in Ammopak with the suffix "-AP" or in tape and reel with the suffix "TR". Please note that in these cases pins are shaped according to tape and reel specifications.

9 Revision history

Table 25. Document revision history

Date	Revision	Changes
14-Mar-2005	9	Add tape and reel for TO-92.
15-Mar-2005	10	Add note on Table 3.
23-Dec-2005	11	Mistake on ordering Table in header.
12-Sep-2006	12	Order codes updated.
07-Jun-2007	13	Order codes updated.
18-Sep-2007	14	Added *Table 1* in cover page.
15-Jul-2008	15	Modified: *Table 1 on page 1* and *Table 24 on page 28*.
18-Aug-2008	16	Modified *Figure 12 on page 17*.
03-Apr-2009	17	Added: R_{thJA} value for SOT-89 *Table 3 on page 5*.
08-Feb-2011	18	Added note *Table 23 on page 26*
21-Feb-2012	19	Modified: SOT-89 *Figure 2 on page 4*.